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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.				
10/689,166	10/20/2003	Mineo Washima	926530-94967	5974				
<div>7590 06/14/2007</div> <div>Robert F. I. Conte Barnes & Thornburg P.O. Box 2786 Chicago, IL 60690-2786</div> <div>EXAMINER ECHELMEYER, ALIX ELIZABETH</div> <table border="1"><thead><tr><th>ART UNIT</th><th>PAPER NUMBER</th></tr></thead><tbody><tr><td>1745</td><td></td></tr></tbody></table> <div>MAIL DATE DELIVERY MODE</div> <div>06/14/2007 PAPER</div>					ART UNIT	PAPER NUMBER	1745	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/689,166	Applicant(s) WASHIMA ET AL.	
	Examiner Alix Elizabeth Echelmeyer	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1,3,5,7,9,11 and 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,4,6,8,10,12 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to the amendment filed March 14, 2007. Claims 1, 3, 5, 7, 9, 11 and 13 were withdrawn in a previous response. Claims 2, 10 and 12 have been amended.
2. Claims 2, 4, 6, 8, 10, 12 and 14 are pending and are rejected finally for the reasons given below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2, 4, 6, 8, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura et al. (US Patent 6,291,094) in view of Suzuki et al. (US Pre-Grant Publication 2003/0044540).

Concerning claims 2 and 4, Yoshimura et al. teach an inexpensive and corrosion resistant gas separator made of metal having surfaces covered with two coating layers (abstract). Yoshimura et al. teach that nickel and titanium are suitable materials for the first coating layer (column 8 lines 46-55).

For the purposes of this rejection, the first layer of Yoshimura et al. corresponds to the joining layer, and the second layer of Yoshimura et al. corresponds to the conductive contact layer.

With regard to claim 6, Yoshimura et al. teach that the coating layers may be on the face of the separator that contacts other fuel cell component members (column 2 lines 9-12).

Regarding claim 8, Yoshimura et al. teach that titanium is suitable for the base material of the bipolar plate (column 8 lines 29-36).

Yoshimura et al. fail to teach the thicknesses for the first and second layers.

Regarding the varying thicknesses of the layers as claimed in claims and 12, Yoshimura et al. teach that the use of the two-layer coating and the materials indicated reduces the overall cost of the separator while providing good corrosion resistance (column 2 lines 15-21).

MPEP 2144.05 B. Only Result-Effective Variables Can Be Optimized

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

Since Yoshimura et al. teach the need to provide good corrosion resistance using the coatings while also maintaining low overall costs for the separator, it would have been advantageous to optimize the thicknesses of the layers to provide good corrosion resistance while still keeping costs down.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the optimal thicknesses of the layers to provide good corrosion resistance while still keeping costs down.

Yoshimura et al. fail to teach that the conductive contact layer is made of a composite compound.

Suzuki et al. teach a non-metallic surface layer, such as a conductive ceramic, that may be used to prevent corrosion in a light weight separator for a fuel cell ([0012]).

As for claim 10, Suzuki et al. teach that the conductive ceramic may be TiN or TiC ([0012]).

Regarding the 0.6eV band gap limitation of claim 2, since the material of Suzuki et al. is the same as the material used in the instantly claimed invention, it inherently has the properties of the material of the instantly claimed invention.

Suzuki et al. teach that the use of their separator with a conductive ceramic coating in a fuel cell is desirable since the environment of a fuel cell is corrosive and the separator is anti-corrosive ([0012]).

It would be advantageous to use the non-metallic surface layer of Suzuki et al. in the separator of Yoshimura et al. since the non-metallic surface layer of Suzuki et al. is anti-corrosive and the environment of a fuel cell is corrosive.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the non-metallic surface layer of Suzuki et al. in

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the separator of Yoshimura et al. since the non-metallic surface layer of Suzuki et al. is anti-corrosive and the environment of a fuel cell is corrosive.

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura et al. in view of Suzuki et al. as applied to claim 10 above, and further in view of Kunimoto et al. (JP 2000-182640).

The teachings of Yoshimura et al. as discussed above are incorporated herein.

Yoshimura et al. teach that the corrosion resistant coatings may be on the face of the plate that contacts other components of the fuel cell, while the non-contacting portions may be covered with a coating such as silicon oxide or resin (Figure 10; column 2 lines 9-12; column 15 lines 6-19).

Yoshimura et al. fail to teach that the non-contacting portions are covered with titanium oxide.

Kunimoto et al. teach a fuel cell having separators made of a light metal having films that protect against corrosion and oxidation (abstract, [0011]). Kunimoto et al. further teach that the parts of the separator not covered by the films may be covered with an oxide, such as one of titanium ([0012]).

Kunimoto et al. teach that this titanium oxide, or other oxide, layer serves as a protective coating to prevent oxidation ([0024]).

It would be desirable to use titanium oxide, as taught by Kunimoto et al., to coat the non-contacting portions of the separator plate of Yoshimura et al. in order to prevent oxidation.

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use titanium oxide, as taught by Kunimoto et al., to coat the non-contacting portions of the separator plate of Yoshimura et al. in order to prevent oxidation.

Response to Arguments

5. Applicant's arguments filed March 14, 2007 have been fully considered but they are not persuasive.

On page 6 of the Remarks, Applicants argue that the composite compound of the instant invention has advantages over the carbon layer of Yoshimoto et al. In the claims that were examined in the previous Office Action, the conductive contact layer was claimed as "carbon OR a composite compound with a bandgap of 0.06 eV or less and having a thickness of 0.0005 μm and less than 0.01 μm ." (Emphasis added). The previous Office Action rejected the claim with a reference that taught carbon. The claims were amended to remove the limitation to carbon. A new rejection is provided above.

On page 7 of the Remarks, Applicants state that the thickness of the various layers is not disclosed in the references. Further, Applicants assert that the thickness is not a mere design choice, but rather offers unexpected advantages. Yet Applicants do not provide proof of these unexpected advantages. All of the examples provided in the specification show advantages of having, for example, the conductive contact layer, but in all of the examples, when the conductive contact layer is present, the thickness is the

same as in other examples having the conductive contact layer. Without proof of unexpected results, this argument is not convincing.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's trainer, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer
Examiner
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